Date: Tue, 18 Oct 94 04:30:41 PDT
From: Ham-Homebrew Mailing List and Newsgroup <ham-homebrew@ucsd.edu>
Errors-To: Ham-Homebrew-Errors@UCSD.Edu
Reply-To: Ham-Homebrew@UCSD.Edu
Precedence: List
Subject: Ham-Homebrew Digest V94 #307
To: Ham-Homebrew

Ham-Homebrew Digest Tue, 18 Oct 94 Volume 94 : Issue 307

Today's Topics:

Send Replies or notes for publication to: <Ham-Homebrew@UCSD.Edu>
Send subscription requests to: <Ham-Homebrew-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Homebrew Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-homebrew".

Date: Mon, 17 Oct 1994 13:17:48 GMT
From: zlau@arrl.org (Zack Lau (KH6CP))
Subject: High power QSK switching

John Seboldt K0JD (rohrwerk@giskard.holonet.net) wrote:
: I would like to build up a solid-state TR switching system for moderate
: power (300 watts).

: Questions:

: Anyone have a nice, safe PIN diode design? That is, with some kind of
: backup if the diodes fail?

One technique that I've used is to bias the amplifier through shunt
diodes. Thus, if the diode opens, allowing the signal to get through,

the amplifier will be biased in the cutoff region, dramatically cutting
the gain. If the diode shorts, it still works as a shunt element.
--
Zack Lau KH6CP/1   2 way QRP WAS
                           8 States on 10 GHz
Internet: zlau@arrl.org   10 grids on 2304 MHz

Date: 17 Oct 1994 22:11:09 GMT
From: myers@Cypress.West.Sun.Com (Dana Myers)
Subject: Looking for MPF102 replacement

In article 54h@vixen.cso.uiuc.edu, hskim@ripley.ece.uiuc.edu (Han Kim) writes:
>Dana Myers (myers@Cypress.West.Sun.Com) wrote:
>> In article 9971@ultb.isc.rit.edu, jdc3538@ultb.isc.rit.edu (J.D. Cronin)
writes:
>> >
>> >I have a few projects in mind that use a MPF-102 for pre-amps on
>> >2-meters and 440. Are there any newer parts that have better gain
>> >or less noise? The Motorola RF Device book doesn't list substitutes
>> >for the MPF102.
>
>> I'd recommend the J308/309/310 family for 2m/70cm pre-amp use. A J310
>> is certainly superior to an MPF102 in these applications. However, you
>> may need to adjust the circuit to the different specs of the J310 (have
>> a look at the data sheets). A 2N4416 is essentially identical to an
>> MPF102, and may be easier to find.
>
>The data sheet I have says a Siliconix U310 (Is this the same device as
>J310?) 16dB of common-gate power gain at 105MHz and 11dB at 450MHz. The
>noise figure is 2.7dB at 450MHz. I think this is certainly better than
>the MPF102. There is also an improved version of MPF102 (MPF106, I think).
>
>But still, this may not be the best choice for preamp circuits. Usually
>MOSFETs are superior to J-FETs at higher frequency, and at 440
>it would be so difficult to find a cheap J-FET that gives the gain and
>NF as a MOSFET would. I usually recommend a dual-gate MOSFET for preamps
>when some people might have a few in their part bin. I think the good old
>40673 has been phased out but there are still plenty to choose from, like
>3SK40, 3SK45, 3SK48, 3SK51, 3SK72-74, 3N204, 3N211, etc. These in general
>will give you 20dB or more of gain and 2dB or less of NF in general up to
>300MHz. I like 3SK72, 3SK73, or 3SK74 most, because they are rather
>inexpensive and available in small microdisk package which is easier to
>work with than TO-18, 72 or 92 package. 3SK72 is mostly used in TV or
>FM radio, whereas 3SK74 has been found on many ham-gears from Japan.
>(I think I first saw this first in my old IC-730 front-end mixer.)
>There is a very good example of a dual-gate MOSFET preamp in recent

>ARRL handbook.

The Motorola data sheet for the J310/U310 suggests that 1.5dB is the typical NF at 450MHz for a J310, and the available gain is certainly in excess of 11dB. I skimmed the data sheets for other Motorola RF MOSFETs; none of them had a lower NF than the J310, though several of them were specified as sporting higher gain. The simple fact is, you don't necessarily want too much gain in a pre-amp; afterall, what good is a pre-amp that makes your radio overload and generate intermod in the front end?

>If you have to buy something new, then I say go for a GaAsFET. There are
>several types you can get for less than 5 buck a piece. A GaAsFET has
>much better NF especially at 440. The handbook has several plans on this,
>too.

GaAsFETs can certainly offer excellent performance, but aren't exactly cheap and are generally a little less rugged than JFETs. Frankly, in the real terrestrial FM world, a super gain/super low noise preamp is probably not as much of an advantage as it is in the small-signal (EME, etc.) world. You can build a J310 based preamp for 450MHz that offers a healthy +13dB of gain with a +19dBm intercept and a noise figure under 2dB quite cheaply (under 50 cents for the J310). When the next electrical storm rolls through, your JFET will probably still be working afterwards, and only costs $.50 to replace if it fails :-)

I personally think people get too hung up on gain, sensitivity and noise figure specifications without considering the gain and noise distribution in a receiver, and also the environment the receiver is operated in. This is how we get .1uV receivers that crunch at the slightest provocation.

The original question was "what is a good replacement for the MPF102?". If the answer is constrained to JFETs, the J310 is probably the best answer in terms of price, availability and performance. It is in the same TO-92 package as the MPF102 and offers superior performance, in most cases with minimal circuit adjustment.

---

 * Dana H. Myers KK6JQ, DoD#: j | Views expressed here are   *
 * (310) 348-6043 | mine and do not necessarily   *
 * Dana.Myers@West.Sun.Com | reflect those of my employer *
 * "Antenna waves be burnin' up my radio" -- ZZ Top   *

Date: 18 Oct 1994 00:22:49 GMT
From: Mike Shales <shales@hookup.net>
Subject: Microwave oven leakage?

Sorry, this is an out of left field question, but...

Is there a simple circuit/device that will show leakage around
a microwave oven? If so I'd like a reference or description :-)

Thanks...   Mike

Shales@hookup.net

Date: Mon, 17 Oct 1994 17:55:13 GMT
From: ravengre@adcae1.comm.mot.com (Gregory Raven Redi)
Subject: Q: VLF antenna design

I would not recommend the loop antenna approach with the requirements
of small size and omnidirectional. An active antenna using an FET as
an impedance transformer would work very well. This is really nothing
more than a common drain amplifier with an electric field probe connected
to the gate.

Regards,
Greg Raven
egr002@email.mot.com

Date: 17 Oct 1994 17:42:14 -0600
From: sinned@u.cc.utah.edu (Dennis Clark)
Subject: requesting opinion on handhelds

     I have looked at several brands of handheld ham radios, and I have
decided on getting either a Yaesu ft530, or a Kenwood th78a. Can anyone
out there give their opinion of either one, or ups and downs of both? I'd
also appreciate any other brands you might recommend, and your reason for
recommending it.
                            Thanks

Date: Mon, 17 Oct 1994 16:50:34 GMT
From: bart@wb6hqk.ampr.org (Bart Rowlett)
Subject: Suggestions for my power distribution system?

In article <finster.345.2E9DFB49@zeus.fasttax.com>,
David Finster <finster@zeus.fasttax.com> wrote:

>
>I'm setting up a ham shack here in my apartment and I'm looking for
>suggestions. Currently I'm using (well, listening for now... still checking
>the mailbox every day for my ticket) a HTX-202 and an Icom 4AT for radios,
>along with a couple scanners. I have a two large (larger than car battery,
>about the size of semi-tractor battery) 12 volt gel-cell batteries and want to
>use them in my power system. (got 'em for free, might as well use em...) My
>current plan runs something like this:
>
>Hook both gel-cells up in parallel, and trickle charge them from solar
>cells. Then run the output from the batteries up to a power distribution
>center (large project box) with a central amp and volt meter on the main line
>to monitor the battery state. I plan to have 4 or 5 outputs on the project
>box. The current plan is to use some Radio Shack "universal voltage adapters"
>to regulate the voltage on the output. I've found the cigarette lighter type
>at swap meets for a couple bucks each. That way I can switch the voltage
>between 3, 6, 9, and 12 volts at each output, and toggle the polarity by
>changing the end plug. I'm not sure how much current draw those adapters will
>stand, even though they are the "high-power" type, and are vented for cooling.
>
>My thought was by using a system like this, I could kill any AC hum in the
>system. Also, I could easily stay on the air when the power goes out.
>
>I do have a few questions:
>
>The batteries have no markings at all. All I know is that they are 12 volt,
>they will take a charge when I charge them up with my 10 amp car battery
>charger, and they weigh a ton. (ok, about 75 or 80 pounds each.) Any ideas
>on what sort of current draw they will stand, and what sort of battery life I
>can expect? These were discarded from a UPS system because they
>reportedly "wouldn't take a full charge". After charging with my battery
>charger, they measure right at 12 volts on my dinky voltmeter, under no load.

When new, they were probably in the 100 AH range. There is no telling what
the capacity is now since they are used but you can easily enough run a
test to determine their useful capacity. The test should be done individually
so you can determine if one is in better shape than the other. Begin with
fully charging the battery followed by a couple of hours to days off the
charger to determine the fully charged open circuit voltage. It should be
around 12.6 volts at room temperature. Next attach a suitable load drawing
perhaps 1 - 5 amps nominal and measure the initial current and battery
voltage under load. An automotive headlamp is an excellent load for this
purpose but the resistance isn't constant at different voltages so you
will need to actually measure the load current. One interesting feature
of incandescent lamps is that the resistance variation with applied voltage
is such that the current tends to be constant, handy for this application.
Periodically record the battery voltage and load current until the voltage
drops to 10 volts at which time you should consider the battery dead. The

battery capacity is then approximately the load current times the number of hours to reach the cutoff. I suggest you make a graph which you can later use to interpret the battery voltmeter.

>
>If I can get a bank of solar cells together that would put out 12+ volts at a
>trickle charge (100 - 200 milliamp) will I hurt the battery by leaving it
>hooked up all the time?

Probably not. As a very rough rule of thumb, I have found the float current required to keep any lead acid (including Gel-Cells) at float voltage is around 1.0 mA per Amp-Hour of battery capacity. This means your system would likely float at around 200 mA and wouldn't be overcharged at that rate. Luckily, when the battery is less than fully charged, the leakage current appears to be more like 0.1 to 0.5 mA per AH capacity meaning the battery will charge somewhat but probably not reach full charge.
>
>Do I need diodes in-line with the solar cells to prevent the batteries from
>leaking voltage back through the solar cells?

This depends on the solar panel. Measure the reverse leakage current and make a determination. If the solar panel (Silicon cells assumed) has 36 cells, the diode is a winner; if it's less than 36 cells then maybe not.
>
>Is my solar-cell idea just a fantasy?

I did exactly what you're talking about a number of years ago and it did the job but I think you'll find an AC charger will be far more cost effective and you'll still have days of endurance if the power fails.
>
>Assuming my solar-cell idea is a fantasy, anyone have useful schematics for a
>trickle charger I can build pretty cheap?
About the easiest is to buy a cheapie 12 V power supply of the sort sold by Radio Shack for running CB radios and car stereos and hack it. Most i've hacked had the expected transformer, rectifier and filter capacitor followed by a pass transistor controlled by a 723 type voltage regulator IC. Some already have a voltage trim pot but you can easily trace the circuit and figure out how to put one in. The supplies are usually equipped with overcurrent protection and are good for a couple of amps; perfect for your application.
>
>I thought it would be useful to have the main volt and amp meters switchable
>so that I could monitor the main line for total current draw and voltage, or
>monitor each output alone. I think it would be too expensive (though
>impressive!) to have seperate meters for the main and all outputs. The
>problem I see is that switching the meters in and out of circuit would disrupt
>power to the outputs while switching. Any suggestions to solve this problem?

Use a meter shunt. The standard approach to the problem of switching ammeters is to permanently install a shunt resistor in series with the circuit whose current is to be measured. A typicall shunt would have a voltage of 50 millivolts for a full scale current, which could be anywhere from an amp to thousands. The shunt is connected to the panel meter which is simply a 0 - 50 millivolt volt meter with the meter face calibrated in amps. Switching the low level signal is simple but be very careful not to blow up the meter movement as they typically only require 1 mA for full scale deflection and will destroy themselves instantly if connected directly to the battery. The same meter movement can also be used to measure battery voltage with a suitable series 'mulitplier' resistor. A typical meter movement for this application will be sold as 0 - 1 ma full scale and will have an internal resistance of 50 ohms giving it a full scale voltage of 50 millivolts. You can make a shunt resistor from ordinary copper wire by calculating the length required to get the desired resistance. For example, suppose you want 2 amps full scale and you have the meter movement described above. You want 2 amps to give a 50 millivolt drop so you using ohms law, you find a resistance of 25 milliohms is required. Going to the wire tables, you find #20 AWG copper wire has a resistance of around 10 milliohms per foot and is easily capable of handling 2 amps. Make the shunt by inserting a three or so foot piece of wire in the circuit to be measured and tapping into the wire at two points along the wire seperated by 2.5 feet. Be very careful to insure it's not possible to have the meter connected when the shunt's not.

>
>I plan to place fuses inline with each output. Any suggestions on type of
>fuses, or are there small circuit breakers that would do the job properly?

Fuses are more versatile and considerably cheaper and easier to find.

>Any hidden grounding problems with the above setup that might bite me? I'm
>currently running from a homemade folded dipole, and a 5/8 wave mag-mount
>antenna, so the whole setup is floating with no earth ground at all. Should I
>be concerned with it?

I would ground the negative side to your safety ground but it may not be absoultly required.

>I know someone out there must have a similar setup. Any comments or hindsight
>observations? I apologise in advance if these seem to be trivial questions
>and a waste of bandwidth.

To begin with I wouldn't bother with the solar panel other than to allow for it in your switch/metering box. You will need a place for the diode and you'll probably find the solar panel current will be the most popular meter position. If you do invest in a panel, I would suggest you don't bother with anything smaller than 0.5 Amp for full sun as it won't help much. If you plan

on keeping your radios on full time you will need a much larger panel.

Feel free to email for clarifactions or further discussion.

bart   wb6hqk

bart@wb6hqk.ampr.org

Date: 17 Oct 1994 11:54:14 -0000
From: mike@io.org (Mike Stramba)
Subject: tuning circuit

I'm experimenting with a simple 'crystal radio circuit': coil in parallel with
a tuning cap from an am radio, germanium diode, lm2904 opamp.

I'm trying to tune it to the 80, 40 or 20 meter bands, and have experimented
with winding different coils, air and toroids. It seems that whatever coil
I use, I'm always tuning either the a.m. broadcast band (~ 1Mhz) or else
around 5Mhz. The circuit is on a plug in breadboard. Would the breadboard
be causing this limitation in tuning?

What would the capacitance range of the tuning cap be? It's from a cheap
a.m radio. The cap is marked 'Nissan PVC-2A'.

As an experiment, I tried replacing the coil with a 3.5Mhz xtal. The
result was no output. Is it possible to use the xtal as a tuning coil?

Mike
--
==
Mike Stramba   Email: mike@io.org
Toronto,Canada   Internex Online - Toronto, Canada (416) 363-3783
==

Date: Mon, 17 Oct 1994 01:51:52 GMT
From: rkm@vectorbd.com
Subject: Understanding frequency

Jerry B Altzman (jbaltz@aloha.cc.columbia.edu) wrote:
: In article <37qsue$cbm@newsbf01.news.aol.com>,
: Mark A Lin <markalin@aol.com> wrote:
: >My name is Mark Lin(KE6KWR). I am a new comer here in the amateur radio.
: >I am having trouble understanding different type of frequency, their
: >behavior and characteristics. For example the how does the 2-meter and

: >4-meter frequency differe? Like I've said I am very new at this but VERY

: One is twice the frequency of the other.

: >interested. If anyone can suggest any books or other source of
: >information. I would be very greatful. Please E-mail me for reply.

: "Look Who's Talking", the book which ARRL puts out to help you pass your
: elements 2 and 3A. You might have read it at one time.

Sigh. As a relative newcomer to Amateur Radio myself, I'm finding that
I'm starting to agree with a large number of the OF's over on
.policy, when it comes to testing requirements. :-(

- Rich

Date: Mon, 17 Oct 1994 17:06:54 GMT
From: mike@shien.ist.csuohio.edu (mike mayer)
Subject: Understanding frequency

markalin@aol.com (Mark A Lin) writes:
: Hello,
:
: My name is Mark Lin(KE6KWR). I am a new comer here in the amateur radio.
: I am having trouble understanding different type of frequency, their
: behavior and characteristics. For example the how does the 2-meter and
: 4-meter frequency differe? Like I've said I am very new at this but VERY
: interested. If anyone can suggest any books or other source of
: information. I would be very greatful. Please E-mail me for reply.
: Thanks
:

Mark,

Not so much that they are different "types" of frequencies (although
they are indeed different), but rather the "different" types of
activities that take place on the various ham bands.

If you are still having trouble grasping all that is above 30MHz,
the ARRL puts out a pretty good introductory book called
"Your VHF Companion". Under $20, can get at most ham stores,
or order directly from ARRL. Sorry, I don't have their number on me.

Also, "Now You're Talking" from Radio Shack is a good book.

Mike

--
^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v Catch the WAVE ^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v^v
Michael Mayer, Senior Technical Support Engineer Amateur Radio KB8RJO
Visual Numerics, Inc. 32915 Aurora Rd. Suite 160, Solon OH 44139 USA
Email: mayer@boulder.vni.com Human: 216-248-4900 Fax: 216-248-2733
v^v^v^v^v^v^v^v^v^v^v Good * Cheap * Quick (pick any two) ^v^v^v^v^v^v^v^v^v^v^

End of Ham-Homebrew Digest V94 #307
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